

**Notes on some deep-water Volutidae, Turbinellidae and Turridae
chiefly from off southern Moçambique and Natal, with
descriptions of two new species (Mollusca: Gastropoda)**

by

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SYNOPSIS

Volutidae: *Volutocorbis glabrata* sp. nov. from off Natal is described. New locality records are given for *Fusivoluta clarkei* Rehder, and its radula figured. *Voluta ponsonbyi* E. A. Smith and *V. africana* Reeve, commonly placed in the genus *Festilyria* Pilsbry & Olsson, 1954, are transferred to *Lyria* Gray, 1847, and possible relationships between *L. ponsonbyi* and '*Festilyria*' *duponti* Weaver are discussed. The presence of degenerate lateral plates on the radula of *L. ponsonbyi* is recorded.

Turbinellidae: *Benthovoluta krigei* sp. nov. from off Moçambique is described, and its probable affinities discussed.

Turridae: *Gemmula* (*Pinguigemmula*) *thielei* (Finlay) and *Bathytoma* (*Parabathytoma*) *regnans* Melvill are redescribed, both being recorded from Moçambique; *Pinguigemmula philippinensis* Powell is synonymized with the former species. *Pleurotoma* (*Genotia*) *belaeformis* Sowerby is referred to the genus *Bathytoma*, subgenus *Micantapex*.

The deep water molluscan fauna of Natal and Moçambique is still very inadequately known, although in recent years the operations of commercial trawlers have brought to light many of the larger species. The present paper deals chiefly with some of these.

I am indebted to Messrs. A. Krige and R. Cruickshank of Durban, and Mr. & Mrs. R. W. Eastwood of Richmond, Natal, for placing this material at my disposal.

Family Volutidae

Fusivoluta clarkei Rehder (Fig. 2a)

Fusivoluta clarkei Rehder, 1969: 206, pl. 40, fig. 8, pl. 43, figs. 37–39; Weaver & duPont, 1970: 183, pl. 77 C, D.

Material from the following Moçambique localities has been examined (samples of each deposited in the Nat. Mus. collection): north of Bazaruto Island (latitude approximately 21.40 S.), 300 fathoms; off Barra Falsa (about 22.55 S.), 290 fathoms; off Lourenço-Marques and east of Inhaca Island (both approximately 26.00 S.) in 250–270 fathoms.

Strength of sculpture on later whorls varies considerably, and some specimens are quite as smooth as the allied *Fusivoluta barnardi* Rehder (1969: 207, pl. 40, fig. 9, pl. 43, figs. 40–43), which appears to differ only in its larger size and larger, more bulbous protoconch. Protoconch dimensions were unfortunately not given by Rehder, but in the only



Fig. 1. *Volutocorbis glabrata* sp. nov. Holotype.

complete *barnardi* examined the protoconch measures 3,8 mm in diameter, as opposed to 2,2–3 mm in *clarkei*. However, in view of the variation found in other members of the family (in *Neptuneopsis gilchristi* Sowerby, for example, the protoconch ranges from 5,6 to 7,5 mm in diameter), this character may prove to be vitiated by individual deviation.

The radula of *clarkei* is figured here for the first time.

***Volutocorbis glabrata* sp. nov. (Fig. 1, 2g)**

Description: Shape typical for genus, length of aperture about twice height of spire; sutures very narrowly and shallowly canaliculate (not to the naked eye); surface of shell dull. Columella with a thin, smooth glaze, becoming thicker at the posterior end of the aperture, where it renders the outer lip continuous with the paries. A thin belt of callus, bearing 2–3 faint striae, is visible above the suture on all whorls from the last half whorl of the protoconch onwards. Columella pleats 7, the posteriormost very feeble. Outer lip thickened, smooth inside, edge posteriorly with two feeble angulations, anal sinus very shallow.

First teleoconch whorl with 16 axial riblets, which are rather weak, straight and narrower than the intervals; these are crossed by three spiral lirae, which are scarcely visible in the intervals, and do not form a cancellate sculpture; however, distinct nodules are present at the points of intersection of the first two lirae, the third being initially very weak; on the second whorl this lira forms a distinct third row of nodules, but on the third whorl it disappears, leaving two rows, one subsutural, the other submedian; these nodules number 15 on both whorls, and are the chief indication of the presence of axial ribs, which are barely visible in the intervals. The interval between the two rows of nodules forms a shallow but distinct groove. The last quarter of the penultimate whorl and the whole body whorl is smooth, except for rather coarse growth lines, and on the base the merest indica-

tion of spiral striae, although these do not actually indent the surface. Teleoconch whorls four.

Protoconch corroded, but apparently consisting of about $1\frac{3}{4}$ whorls, rather dome-shaped; initially smooth, but last $\frac{1}{2}$ whorl with 13 thin, straight axial ribs, which do not quite reach the sutures. Boundary between protoconch and teleoconch indicated by an abrupt change in sculptural detail.

Dimensions: Length 22,7 mm, width 10,5 mm, length of aperture 16,8 mm, diameter of protoconch 2,1 mm.

Type material: Holotype (Nat. Mus. No. 7667, T 1560). Off NATAL, 80 fathoms, don. H. W. Bell-Marley, 1921, ex s.s. *Pickle*.

Diagnosis and remarks: Although only a single specimen is available, and that without exact locality data, this species is so abundantly distinct from the six other living members of the genus that no excuse is needed for its introduction as a new species. It is distinguishable from its congeners by the almost smooth body whorl, by the sculpture of the spire whorls, which basically consists of 2–3 well-spaced spiral rows of granules arranged on very feeble axial ribs, and by its small size. The axially ribbed termination of the protoconch would also appear to be a unique character.

Lyria ponsonbyi (E. A. Smith) **comb. nov.** (Fig. 2b)

Voluta (Alcithoe) ponsonbyi E. A. Smith, 1901: 231.

Voluta ponsonbyi; Cooke, 1922: 10, fig. 4 (radula); Barnard, 1959: 20.

Festilyria ponsonbyi; Weaver, 1968: 444, pl. 60, figs. 3, 4; Weaver & duPont, 1970: 59, pl. 21 E, F, text-fig. 11b.

Lyria africana (Reeve) **comb. nov.**

Voluta africana; Barnard, 1959: 19 (references).

Festilyria africana; Weaver & du Pont, 1970: 57, pl. 21 A–D, text fig. 11a (further references).

Both *Voluta ponsonbyi* Smith and *V. africana* Reeve were referred by Weaver, and by Weaver & duPont (loc. cit.) to *Festilyria* Pilsbry & Olsson, 1954, a genus erected originally for *Voluta festiva* Lam. Pilsbry & Olsson (p. 24) did not compare *Festilyria* directly with *Lyria*, but referred their new genus to the Fulgorarinae rather than to the Lyriinae on account of the obliquely coiled protoconch and the supposed absence of a basal fasciole (Weaver, 1968: 442, showed the latter to be in fact present). No specimens of *festiva* are available, but in neither *ponsonbyi* nor *africana* is the protoconch of deviated form, and a fasciole is present in both. There are in fact no conchological reasons why these two species should not be referred to the genus *Lyria*. While *ponsonbyi* and *africana* superficially differ from their congeners in the presence of strongly angular shoulders to the axial ribs, an intermediate condition is to be found in *L. queketti* (E. A. Smith). The true position of *Festilyria* must remain in abeyance until anatomical details for the type species are known.

Most specimens of *Lyria ponsonbyi* in collections lack exact locality data, and the species is so far known definitely only from off Durban (type locality), and from off Scottburgh and Port Shepstone (Nat. Mus.).

While both *ponsonbyi* and *africana* have tricuspid rachidian teeth, normal for the genus *Lyria*, they may prove to be atypical on account of the presence of degenerate lateral plates. First shown to occur in *africana* by Aiken (1969: 2a), these are clearly visible in a

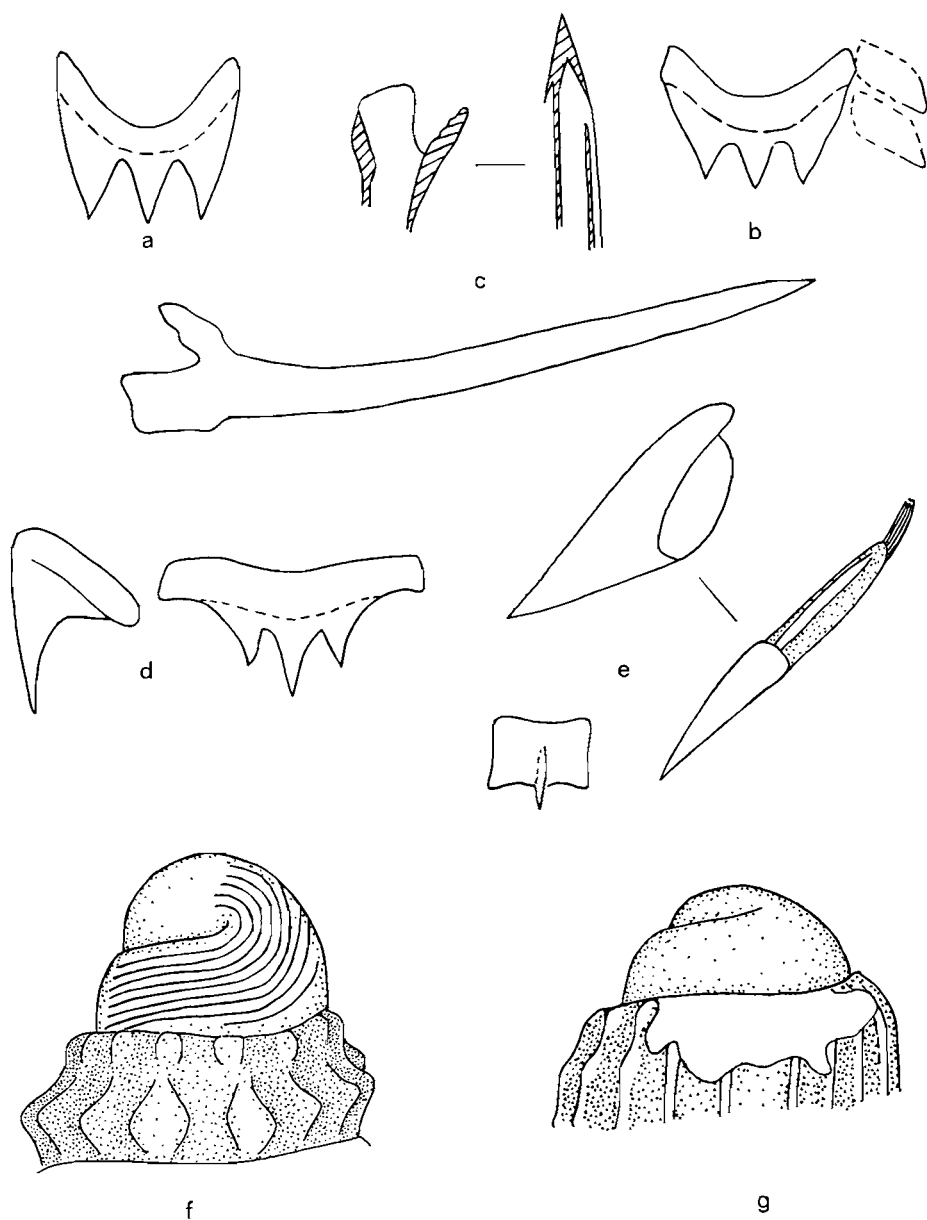


Fig. 2. Radulae of: *a*, *Fusivoluta clarkei* Rehder; *b*, *Lyria ponsonbyi* (E. A. Smith); *c*, *Bathytoma regnans* Melvill, with longitudinal sections of base and apex inset above; *d*, *Benthovoluta krigei* sp. nov. (holotype); *e*, *Gemmula thielei* Finlay, with marginal plate shown also in side view. Protoconch and first teleoconch whorl of: *f*, *Bathytoma regnans* Melvill; *g*, *Volutocorbis glabrata* sp. nov. (holotype), first teleoconch whorl partly corroded.

radula extracted from a shell-less body labelled as *ponsonbyi* in the Natal Museum collection (don. H. W. Bell-Marley). These laterals are diaphanous and stain very poorly; they are best seen in an aqueous medium or in polyvinyl lactophenol mountant. They are invisible, on the other hand, in balsam-type mounting media, which perhaps explains why their presence has not previously been reported. They should be sought in other species of *Lyria*.

Festilyria duponti Weaver (1968: 444, pl. 60, fig. 1, 2, 7) from off Boa Paz, Moçambique, is a problematic species. While clearly very similar to *ponsonbyi*, it was separated chiefly by the larger protoconch (diameter 3.5 mm) and the presence of definite axial ribs, bearing low shoulder nodules, rather than showing only 'ribless pointed tubercles' as in *ponsonbyi*. However, most of the *ponsonbyi* in the Natal Museum collection have protoconchs whose diameters are in fact in the 2.7–3.4 mm range, while axial ribbing is often well developed, and shoulder nodules range in profile from subspinous to gently rounded. The only valid differences seem to be that *duponti* attains a larger size, has a relatively higher spire (with an aperture of about $1\frac{1}{3}$ times the length of the spire, instead of twice its length as in *ponsonbyi*) and has well-developed black markings around the peristome. Viewed in conjunction with the known geographic ranges of *duponti* and *ponsonbyi* these minor differences would seem to indicate a clear-cut subspecific relationship between the two. However, Turner (in Weaver & duPont, 1970: text-fig. 11c) has figured the rachidian tooth of *duponti* as being of a peculiar parallel-sided form, quite different from that of *ponsonbyi*. Assuming this figure to be correct and the shell-less bodies examined by me, and probably by Cooke (loc. cit.) to be correctly identified, then the two can hardly be regarded as congeneric, let alone conspecific.

Family Turbinellidae

***Benthovoluta krigei* sp. nov. (Figs. 3a, b, 2d)**

Description: Shape narrowly fusiform, spire about $\frac{4}{5}$ length of aperture; whorls rather flat-sided, but weakly shouldered, aperture rather narrow. Columella without any trace of pleats, callus thin and white, in parietal region forming a transparent glaze which does not mask the underlying spiral sculpture. Siphonal canal long, subequal in length to the aperture, but not clearly set off from it, widening slightly near tip. Outer lip thin, edge weakly crenulate and forming a shallow sinus on shoulder.

Protoconch missing, * $9\frac{2}{3}$ whorls remaining.

Teleconch sculpture: Initial $\frac{1}{3}$ of first whorl (= latter part of protoconch ?) with numerous very fine spiral striae only, but by the end of this whorl five distinct spiral lirae have developed, increasing to 9 on the 3rd, 15 on the 6th and 20 at the end of the penultimate whorl, with a total of 58 lirae on the body whorl. These lirae are flat-topped, wider than their intervals, and transversely incised by fine incremental striae. On the spire they cross the axial ribs, but on the body whorl, where only coarse growth lines remain, they are cut into irregular, flat-topped pustules, rendering this whorl rugose to the touch. Axial ribs 12 on first whorl, increasing to 13 on the 8th, and to about 16 on the penultimate one, but on the latter part of this whorl they become lower and more irregular, and on the body

* A specimen (in coll. M. Meyer) retaining the protoconch has since been examined. It consists of about $1\frac{1}{4}$ whorls, which are slightly globular and deviated from the main axis; its surface is slightly eroded, but was apparently smooth; diameter 1.7 mm. Unfortunately the protoconch of *Surculina* appears to be unknown, but judging by the description given by Kuroda & Habe, 1950, that of *Benthovoluta hilgendorfi* is similar, save that it is described as 'depressed', an adjective certainly not applicable to *B. krigei*.



Fig. 3. *Benthovoluta krigei* sp. nov., holotype. *a*, Adapertural view; *b*, lateral view.

whorl they are very numerous, close and irregular and tend to merge with the growth lines. On the spire the axial ribs are sharp-topped, subequal to the intervals, and extend from suture to suture, but by the penultimate whorl they have become very weak at the sutures.

Colour flesh, paler on spire, with three obscure purplish transverse bands on the body whorl; aperture whitish.

Dimensions: Length 70,9 mm, width 17,8 mm, length of aperture 39,1 mm.

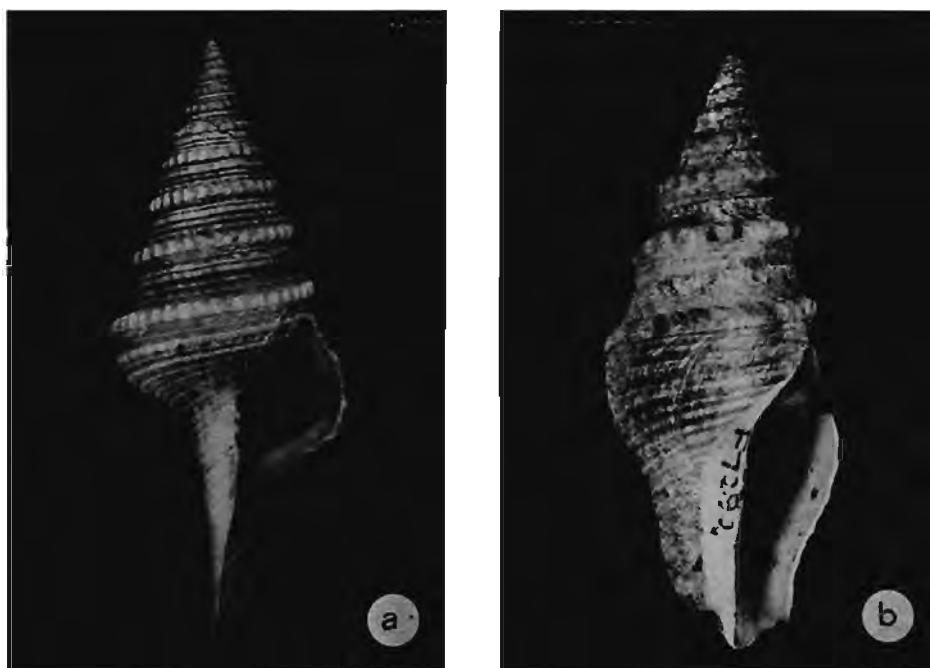


Fig. 4. *a*, *Gemmula thielei* Finlay, specimen with four supra-peripheral lirae, from off Inhaca Island in 270 fathoms; dimensions 59,4 × 22,1 mm. *b*, *Bathytoma regnans* Melvill, locality unknown, dimensions 41,7 × 16,5 mm.

Operculum as in *Benthovoluta hilgendorfi* (Von Martens) (cf. Kuroda & Habe, 1950: text fig. 4).

Radula formula 1-R-1; rachidian tricuspid, with broad, arcuate base, laterals simple, claw-shaped; 69 rows.

Animal white, tentacles thin and filiform, eyes at outer sides of bases.

Type material: Holotype, Natal Museum No. 6077 (T1561); trawled 80 kilometres due east of INHACA ISLAND in about 280 fathoms. Named in honour of the collector, Mr. A. Krige.

Discussion: The generic position of this very attractive species requires further investigation. Initially two generic locations seemed possible, namely, *Surculina* Dall, 1908, from the eastern Pacific, and *Benthovoluta* Kuroda & Habe, 1950, from the western Pacific. As far as shell features are concerned, the present species shows the greatest resemblance to members of the former genus, in particular to the type species, *Surculina blanda* (Dall). Anatomical details of the latter are unfortunately unknown, but the radula of the related *S. cortezi* (Dall), as figured by Rehder (1967: fig. 10), differs from that of *krigei* in possessing bicuspid lateral teeth; furthermore, according to Dall (1908: 292) the animal has neither eyes, tentacles nor operculum. These features clearly preclude the admission of *krigei* to *Surculina*, despite the conchological similarity. Members of the genus *Benthovoluta* are comparable in general shell-form, in opercular structure, and in the nature of the radula

(cf. Habe, 1952: text-fig. 5), but differ in possessing two or three weak columella pleats; however, this character cannot at present be regarded as of sufficient importance to warrant generic separation.

Benthovoluta krigei differs from the only two other recent members of the genus, *B. hilgendorfi* (von Martens) from Japan, and *B. gracilior* Rehder from the Philippines, in its shouldered whorls, absence of columella pleats and in details of shape, coloration and sculpture. Superficially there is a far greater resemblance to *Surculina blanda* from the Gulf of Panama (cf. Dall, 1908: pl. 3, fig. 1, and Rehder, 1967: text fig. 7), that species differing chiefly in its lower spire and rounder whorls.

Of local species, '*Fusivoluta*' *elegans* Barnard (1959: 32, fig. 8a) will probably prove to be congeneric. *B. krigei* differs from this species in its much larger size, coarser and fewer axial ribs, and its distinctly shouldered whorls.

'*Fasciolaria*' *holcophorus* Barnard (1959: 98, fig. 21) is almost certainly referable to the Turbinellidae, but will probably prove to be either a *Ptychatractus* or a *Metzgeria*.

Family Turridae

Gemmula (*Pinguiggemmula*) *thielei* (Finlay) (Figs. 2e, 4a)

Pleurotoma (*Gemmula*) *fusiformis* (non Sowerby) Thiele, 1925: 210, pl. 22, fig. 24.

Gemmula thielei Finlay, 1930: 47.

Pinguiggemmula thielei Powell, 1964: 279, pl. 215, fig. 7.

Pinguiggemmula philippinensis Powell, 1964: 278, pl. 215, figs. 3, 4 **syn. nov.**

Sufficient material of this inadequately-described species has become available to enable the extent of individual variation to be gauged. *Pinguiggemmula philippinensis* clearly falls within the range of variation, and must be relegated to the synonymy. The latter was said to differ in having two instead of three suprapерipheral spiral lirae and in these being gemmate to some extent, instead of smooth as implied by Thiele's figure. As indicated below, the number of suprapерipheral lirae varies individually and their degree of gemmulation depends on the strength of the growth lines.

A detailed redescription is pertinent at this stage.

Protoconch missing and first teleconch whorl corroded in all specimens examined; a maximum of 9 whorls remaining. Protoconch $\frac{1}{4}$ to $\frac{1}{3}$ distance from lower suture, bearing distinct gemmae, about 34–50 on the penultimate whorl, often becoming obsolete towards the end of the body whorl. Suprapерipherally each whorl bears 2–4 main spiral lirae, usually with weaker intermediaries. Variation in this respect, on the penultimate whorls of 6 specimens, may be indicated as follows, the letters representing major lirae, reading from suture to peripheral keel ('K'), and the numerals in brackets the number of intermediaries between each pair: A–B–(2)–C–K; A–(1)–B–(2)–K; A–B–(1)–C–K; (1)–A–B–C–K; (1)–A–(1)–B–(1)–C–K; A–B–C–D–K. The first major lira ('A') may occasionally be shallowly bisected by a spiral groove. In addition 3–7 feeble spirals may show between the gemmae, and 1–2 spiral lirae are often present between the keel and the lower suture. The base shows 1–3 strong spiral keels with weaker intermediaries, at the level of the top of the aperture, followed basally on the rostrum by 20–30 weaker spiral lirae, becoming rather feeble towards the tip. Growth lines coarse, usually rendering the

supraperipheral lirae weakly and irregularly nodular, but having less effect on the infra-peripheral ones. Colour dull white throughout.

Length 59,4 mm, width 22,1 mm, length of aperture 33,6 mm.

Operculum leaf-shaped, with terminal nucleus.

Radula formula 1-0-R-0-1, marginals of typical 'wish-bone' shape, rachidian quadrangular with thin, transparent base and a sharp median cusp.

Distribution: Off western Sumatra, 614 metres (type locality); off Luzon, Philippines, 280 fathoms (*philippinensis*); off Lourenço Marques and off Inhaca Island, 270 fathoms (Nat. Mus., don. Mr. & Mrs. R. W. Eastwood).

Bathytoma (Parabathytoma) regnans Melvill (Figs. 2c, f, 4b)

Bathytoma regnans Melvill, 1918: 68, text fig.

The original description and figure of this species are neither very clear nor detailed, but would appear to apply to the present specimens. While some discrepancies do exist, these are of doubtful significance in view of the variation known to occur in related species (e.g. *B. attractoides* Watson). Thus while Melvill's statement that the columella is medially 'tuberculo-plicata' does not apply to the present specimens, Dall (1889: 6) found the development of a columella pleat to be an individual feature in *B. viabrunnea* (Dall). Other respects in which the type description disagrees with the material at hand, are in the relatively small number of basal cords (about 15 instead of about 24-27), these being also apparently more granular, and in the more prominent peripheral cord. None of these can at present be regarded as sufficient to warrant specific separation of the Moçambique population.

A detailed redescription is given here.

Form biconic, aperture approximately equal to spire in length, suture fairly deep. Columella with a well-developed white callus, distinctly swollen medially, but not forming a pleat; surface smooth to the naked eye, except for growth lines, but under magnification the inner side of the columella is seen to be microscopically granulose. Outer lip thin, smooth inside, edge prominently curved; anal sinus deep, peripheral, narrowly U-shaped, margins divergent at opening.

Teleoconch whorls 8 in number. Peripheral cord well developed throughout, usually median, but occasionally on the basal third of each whorl; this cord bears a series of rounded gemmules, numbering 14-19 on the first whorl (at which stage they are angular in apical view), and increasing to 20-22 by the 7th whorl, where they give the profile an undulating outline; on the body whorl the gemmules have become too flattened and irregular to count, and are barely visible towards the back of the lip. Initially there are also a series of sub-sutural nodules, delimited below by a distinct spiral groove, but from the second or third whorl these nodules become plicate, and the groove degenerates to a mere supraperipheral concavity. The subsutural plicae are obliquely inclined and parallel to the growth lines, and on the body whorl become so fine and numerous as to merge with the latter. Supraperipheral spiral sculpture is generally very feebly indicated on the spire, but traces are usually visible in the supraperipheral concavity and on the gemmate cord; there are usually 2-3 weak lirae below the periphery, although occasionally these are obsolete. Base with approximately 24-27 spiral lirae, very weak and flattened below periphery, but becom-

ing stronger and more rounded anteriorly; an occasional spiral is weaker than its neighbours. Spiral lirae are rendered somewhat rugose throughout by growth lines, but are not granular.

Protoconch $1\frac{1}{4}$ – $1\frac{1}{2}$ whorls, shape bulbous and deviated from main axis; smooth, except for traces of faint spiral striations, and 4–6 feeble peripheral plicae near its termination.

Colour off-white, aperture and columella pure white; periostracum very thin, transparent, pale yellowish.

Dimensions: Max. length 41,7 mm, breadth 16,5 mm, length of aperture 21,2 mm, protoconch diameter 1,6 mm.

Operculum ovate, with concentric growth lines and a subcentral nucleus; colour pale amber.

Radula teeth very similar to *B. (P.) luhdorfi* (Lischke) (cf. Powell, 1966: text fig. 120) and *B. (P.) attractoides* forma *aethiopica* (Von Martens) (cf. Thiele, 1925: text fig. 24), although the barb is very minute; one side of the shaft bears a narrow keel, commencing at the terminal opening of the venom duct.

Tentacles and male genitalia are as described by Dall (1889: 81) for *B. viabrunnea*, except that the former are somewhat dorsiventrally flattened rather than cylindrical, and the penis tapers rather abruptly to a fine point. Animal pure white in colour.

Distribution: Type locality uncertain, thought to be the Bay of Bengal. Moçambique: east of Bazaruto Island in 300–310 fathoms (Nat. Mus. don. Mr. & Mrs. R. W. Eastwood); also a number of specimens from unknown locality (don. Mr. R. Cruickshank).

Genota (Dolichotoma) fissa von Martens (1903: 87, pl. 1, fig. 14) from east of Somaliland, is both congeneric and consubgeneric, apparently differing only in the stronger and coarser subsutural plicae and somewhat more markedly granular basal cords. Should it prove to fall within the range of variation of *regnans*, *fissa* will take precedence.

Accounts of opercular structure in *Bathytoma* are difficult to integrate. Thus Dall described the operculum of *Bathytoma (Bathytoma) viabrunnea* as being normally leaf-shaped with an apical nucleus (as in *Bathytoma (Parabathytoma) luhdorffii*, according to Powell, 1966: 64). However, Dall also recorded three 'abnormal' specimens with small concentric opercula. Only two opercula of *regnans* are available, but both are of the latter type. Furthermore, Schepman (1913: 405) described the operculum of *B. (P.) attractoides* as oval, 'with the nucleus at the right side' (it is unfortunately not indicated whether this nucleus is marginal or just acentral). At all events insufficient data is available for the significance of opercular structure in *Bathytoma* to be gauged.

Bathytoma (Micantapex) belaeformis Sowerby

Pleurotoma (Genotia) belaeformis Sowerby, 1903: 216, pl. 4, fig. 8.
'*Genotia* *belaeformis*'; Barnard, 1958: 112, figs. 8b, 9b.

Although the absence of peripheral gemmules would indicate this to be a most atypical member of the genus, the characteristic dagger-shaped, barbless radula teeth (cf. Barnard, 1958: fig. 8b) show it to be referable to the subgenus *Micantapex* Iredale, 1936, as defined by Powell (1966: 64). According to Barnard the operculum is ovate with an apical nucleus.

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